

(19) World Intellectual Property
Organization
International Bureau



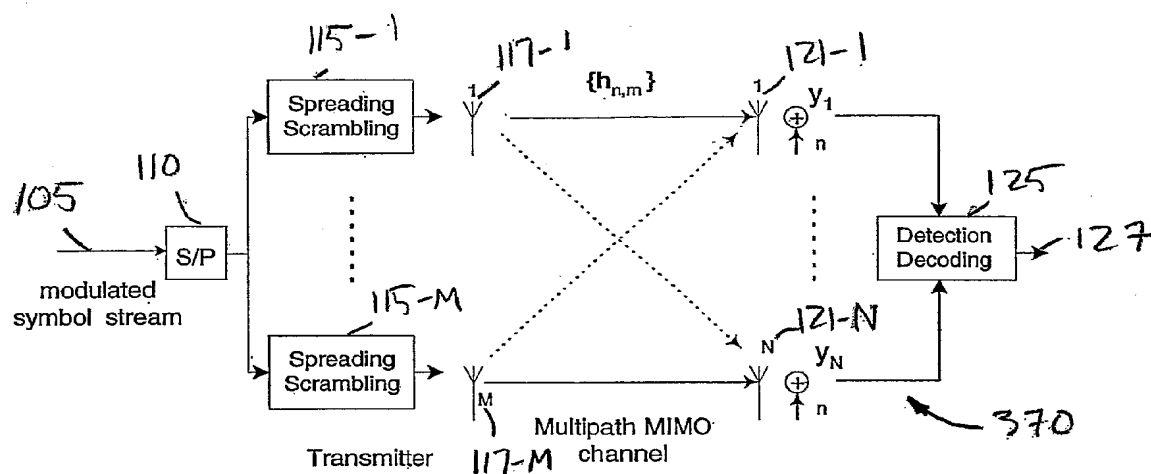
(43) International Publication Date
15 September 2005 (15.09.2005)

PCT

(10) International Publication Number
WO 2005/086500 A1

- (51) International Patent Classification⁷: **H04Q 7/00**
- (21) International Application Number: PCT/US2005/006132
- (22) International Filing Date: 23 February 2005 (23.02.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/548,477 27 February 2004 (27.02.2004) US
- (71) Applicant (for all designated States except BB, US): **NOKIA CORPORATION** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).
- (71) Applicant (for BB only): **NOKIA, INC.** [US/US]; 6000 Connection Drive, Irving, TX 75039 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **ZHANG, Jianzhong** [CN/US]; Apt. 3120, 5337 North MacArthur Boulevard, Irving, TX 75038 (US). **RAGHOTHAMAN, Balaji** [IN/US]; 1505 High Country Lane, Allen, TX 75002 (US). **MANDYAM, Giridhar** [US/US]; 4404 Maize Drive, Plano, TX 75093 (US).
- (74) Agent: **SMITH, Harry, F.**; Harrington & Smith, LLP, 4 Research Drive, Shelton, CT 06484-6212 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONSTRAINED OPTIMIZATION BASED MIMO LMMSE-SIC RECEIVER FOR CDMA DOWNLINK



(57) Abstract: A system according to embodiments of this invention provide a multiple transmit antenna (117-1..M), multiple receive antenna (121-1..N) (MIMO) receiver (125) design for the communication downlinks such as those used in CDMA technology. Two algorithms referred to as the MIMO LMMSE-FFT and MIMO LMMSE-SIC (Successive Interference Cancellation) algorithms, are described in detail. In embodiments of the invention, the interference cancellation step is achieved without the impractical assumption of the knowledge of all the active Walsh codes in the systems, unlike many other interference cancellation based algorithms found in the literature.